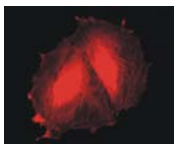
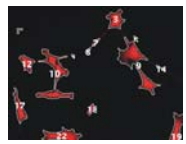
National Institute of Standards and Technology Chapter

Quantitative Cell Biology in the Cell and Tissue Measurements Group at NIST



by John T. Elliott



Thursday, November 10, 2005
10:30 a.m., Bldg 101, Lecture Room B

Fluorescence microscopy has been used extensively as a tool to understand biology at the cellular level. Advances in imaging instruments and biological reagents allow visualization of biological activity within cells, but highly quantitative measurements of cellular behavior have been limited. One difficulty in interpreting data from different cell biology laboratories has been the lack of accepted protocols for preparing highly reproducibile cell culture enviroments. We have developed a suite of tools to facilitate quantitative cell biology measurements with fluorescence microscopy. These tools include robust cell stains, open source image analysis software and thin film fibrillar collagen substrates that serve as reproducible cell culture substrates. The use of these tools with automated fluorescence microscopy instrumentation gives us the ability to make unbiased measurements of many individual cells within a cell population. Our measurements of cell morphology and green-fluorescence protein expression indicate that individual cells within a population do not exhibit the same response even under identical culture conditions. A population of cells exhibits a distribution of responses and this distribution is highly reproducible under controlled culture conditions. Our results provide insight into the issues that must be considered during development of a metrology for quantitative cell biology.

Dr. Elliott is a Research Scientist in the Cell and Tissue Measurements Group of the Biochemical Sciences Division, CSTL, NIST. He obtained his Ph.D. in Physiology and Biophysics at SUNY Stony Brook in 1999 and began his research at NIST under an NRC post-doctoral fellowship. Dr. Elliott received the Young Scientist Award for Excellence in Scientific Research from the NIST Chapter of Sigma Xi in 2005.

For more information, please contact Magdalena Navarro (301-975-2130), magdalena.navarro@nist.gov)